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NOTE:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
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DENVER, COLORADO 80202-2466

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Ref: 8HWM-FF

Mr. Joe Schieffelin
Colorado Dept. of Human Health & Environment
4300 Cherry Creek Drive South
Denver, CO 80220

RE: **Draft Interim Measure/Interim Remedial Action for OU 4.**

Dear Mr. Schieffelin:

The purpose of this letter is to transmit EPA's comments and those of our contractor (PRC) on the referenced document. Overall, EPA feels that the document needs to undergo extensive revisions. EPA suggests that a close coordination between DOE and the regulatory agencies take place during the resolution of the comments. Also, the parties of the IAG should coordinate the comment resolution process with the ongoing OU 4 dispute resolution. In this manner, adequate responses to the comments can be incorporated into the Final IM/IRA document expediting its final approval by the regulatory agencies.

If you have any questions or would like to discuss the comments in detail, please contact Arturo Duran of my staff at 294-1080.

Sincerely,

Martin Hestmark

Martin Hestmark, Manager
Rocky Flats Project

Enclosures
cc: Frazer Lockhart, DOE
Steve Keith, EG&G
Gary Baughman, CDH
Harlan Ainscough, CDH
Arturo Duran, EPA

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ADMIN RECORD

A-OU04-000271 3

EPA's Comments on the Draft IM/IRA Document
for OU 4, the Solar Ponds

- In general, EPA feels that the document did not adequately address EPA's verbal comments and PRC's comments provided during the roundtable review on the preliminary draft document. There are several outstanding issues remaining that need to be resolved prior to the submittal of the final IM/IRA document. These issues are detailed in the attached PRC comments.

- The comments pertaining to parts I, II, and the COC and PRG development in part III, are provided for your information only, with the purpose of improving the quality of the document. EPA does not expect these particular comments to affect the closure decision for OU 4, as risk assessment is not required for the selection and performance evaluation of the closure alternative (engineering barrier) for OU 4.

- The comments on part III regarding the selection of the proposed cover design to close the OU 4 and part IV and part V are essential in nature. EPA expects these comments to be fully addressed. EPA's concurrence on the IM/IRA is dependent on satisfactory resolution of these comments.

- EPA could not assess the technical and regulatory justification for the proposed design. The information included in the IM/IRA document indicates that the proposed action is inappropriate and over designed for the OU 4 site specific conditions and contamination. EPA suggests that DOE take a closer look at the information available on OU 4 and reevaluate closure strategies and options that may offer a more cost effective and appropriate remedy for the OU 4 closure. EPA believes that the regulatory requirements can be met with a less extensive cover design and still achieve acceptable performance and protection.

- The need for the proposed post-closure monitoring program included in part V is also questionable. Specifically, the proposed monitoring within the cover system and vadose zone appears to be unnecessary. The RCRA post-closure requirements do not include the need for this type of monitoring. In addition, the 1000 year design system includes a drainage layer to be placed beneath all contaminated materials above the mean high groundwater elevation. The purpose of the drainage layer is to prevent groundwater coming in contact with waste materials. Furthermore, the proposed cover design consists of about 10 feet of layers of different materials to prevent infiltration for the next 1000 years. Therefore, it is very unlikely, that waste materials will ever be in contact with any liquids. DOE should justify the need for this extensive vadose zone monitoring system.

- EPA feels that the excavation of all contaminated liners and soils for the purpose of installing the proposed drainage layer may create a higher potential risk to human health and the environment than leaving them in place. EPA believes that there are other options such as vertical barriers upgradient (slurry walls, interceptor collection systems) that may be better solutions to the uprising groundwater problem. DOE must evaluate in detail the applicability, feasibility and technical performance of vertical barriers at OU 4.

- The need to provide infiltration protection for the next 1000 years is questionable. VLEACH modeling on the migration potential of contaminants to groundwater showed no groundwater impacts by the contamination caused by infiltration. DOE should revisit the need for infiltration protection.

- EPA questions the adequacy of the cost estimate provided in the IM/IRA document. Construction costs add up to about $18 million. However, the addition of other costs for engineering management, construction management and contingency inflates the cost to about $56 million. This appears to be excessive for a construction project that consists mainly of earth work with no sophisticated electrical and mechanical process engineering. DOE must include a breakdown and justification of these cost estimates.

COMMENTS

1.0 EXECUTIVE SUMMARY

1. Page ES-2, Paragraph 2. The paragraph states that the drainage layer will be installed beneath the hazardous waste. This paragraph is misleading. The sentence should be revised to specify that the drainage layer will be installed beneath the hazardous waste liner materials and the excavated contaminated media (or soils).

2.0 PART I

General Comments

1. The categories of land use listed in Section 5.4 (urban and suburban residential, business/industrial, and open space/agricultural) do not correspond with the categories listed in I.4.1 (residential, commercial, industrial, agricultural, and open space). They should be made consistent.

Specific Comments

1. Section 1.2, Page I-7, Figure 1.2-1. The figure shows RFP in relation to the entire state of Colorado, but not in relation to Denver. The small scale of the state map makes it difficult to accurately place the RFP in relation to Denver. The figure used in the roundtable review draft showed the RFP in relation to Denver. A combination of the two figures would be more helpful.

2. Section 1.2, Page I-8, Figure I.2-2. The protected area fence line on the far left side of the figure shows a different fence line than was previously shown on the roundtable draft figure. If this fence line is incorrect, it should be corrected.

3. Section 1.2, Page I-16, Paragraph 1. The first sentence states that the solar evaporation ponds (SEPs) are "interim status hazardous waste management units." It should be clarified

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that they are Resource Conservation and Recovery Act (RCRA) interim status hazardous waste management units.

4. Section 1.2, Page I-17, Figure I.2-4. The figure from the roundtable draft shows the footing drain that runs along the east side of SEP 207-C extending north all the way to the french drain system. The current draft shows the footing drain stopping about 200 feet south of the french drain. If the footing drain extends to the french drain, the current figure should be corrected.

5. Section I.3, Page I-20, Second Line. The second line on the page says "Section Part IV.2.2." The word "Section" or the word "Part" should be deleted.

6. Section I.4, Figure 1.4.3. In response to comments on the roundtable review draft IM/IRA document, a paragraph on the development of the Rock Creek project in Superior, which will eventually have 3,500 residences, has been included. However, Figure I.4.3, which shows year 2010 expected residential population, has not been revised to include this development. The figure should be updated to reflect the new information so that the text and the figure are consistent.

7. Section 1.4, Page I-21. The second paragraph discusses but does not specifically reference Figure I.2-2. That reference should be included.

8. Section 1.4, Page I-28, Figure I.4-4. The roundtable version of Figure I.4-4 provides a scale and notes the approximate location of OU 4. The current version shows neither, and should be revised to show both.

9. Section 1.4.3.2, Page I-33, Paragraph 1. The text states, "The RFP is now considered to be a 'major source' (see Note [2] below) only for emission of oxides of nitrogen." The potential significance of being classified a "major source" is not, but should be, discussed. For instance, a facility classified as a "major source" may be required to implement stringent measures to reduce or control air emissions. Information that may have a significant impact on regulatory compliance for RFP should be clearly discussed.

10. Section 1.4.3.2, Page I-33, Bottom of Page Under "Note 2". The text states that "Sources not on the list of the 28 source categories are allowed to emit up to 250 tons per year (TPY)

of criteria or non-hazardous pollutants." This definition does not appear correct. The current interpretation of the Clean Air Act Amendments of 1990 indicates that the value "250 TPY" should be changed to "100 TPY." The text should be revised to present accurate information.

11. Section 1.4, Page I-34, Figure I.4-7. There is a large unlabeled water body on the west side of the Woman Creek Drainage Basin in Figure I.4-7 that appears to be Rocky Flats Lake. This water body should be labeled.

12. Section 1.4, Page I-36, Figure I.4-8. This figure does not outline the perimeter of OU4. An outline would clarify what part of OU4 is in the floodplain. The figure should be revised.

13. Section 1.4, Page I-40, Figure I.4-11. Not all the soil types listed in Figure I.4-11 are included in the legend. Soil types 30, 103, and 169, as well as the letter "w" are missing from the legend. The missing information should be included on the figure.

14. Section 1.4, Page I-44, Figure I.4-14. The summary description of the Benton formation in Figure I.4-14 contains a typographical error: "owry" should be "Mowry." This should be corrected.

15. Section 1.4, Page I-51, Line 4. The study referenced is by "OE." This appears to be a typographical error and should be changed to U.S. Department of Energy ("DOE").

16. Section 1.4, Page I-59, Paragraph 1. According to this paragraph, the total 20-year traffic projection for State Highways 72 and 93 in the May report is 42,000 average daily traffic (ADT), based on a 1994 report. The roundtable draft's projection, based on 1991 and 1992 reports, was 27,430. However, the population estimates in Figures I.4-2 and I.4-3 have not changed when compared to the roundtable review draft. The figures should be reviewed and any new data incorporated into them.

17. Section I.4.8. The spellings of scientific names used throughout the section are frequently incorrect or inconsistent. All of the names should be reviewed.

18. Page I.A-8, December 1960. Appendix I-A (Solar Ponds History) states that all 207-B SEPs were returned to service in December 1960. Section I.2.1.3, page I-14, of the report states

that only SEP 207-B South was returned to service at that time, and that repairs on the others were deferred due to funding problems. This inconsistency should be resolved and the appropriate corrections made.

19. Section I.2.1.1, Page I-11. This section states that there was a discharge to the original SEPs in March 1963. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

20. Section I.2.1.3, Page I-14. This section states that "an unsuccessful attempt was made to fill the cracks on the side walls of SEP 207-B North with asphalt mastic." This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

21. Section I.2.1.1, Page I-11. This section states that ponds 2 and 2D were regraded in 1970, and that the soils and dikes may have been used to construct SEP 207-C. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

22. Page I.A-20, May 1978. Appendix I-A states that asphalt from the 207B SEPs was removed and boxed, but Section I.2.1.3, page I-15 of the report states that "asphalt concrete liners were not removed." It is unclear whether these two statements are consistent. They should be clarified.

23. Section I.2.1.4, Page I-15. This section states that the Petromat liners in SEPs 207B Center and South were removed in 1978. None of the events described in the first paragraph on that page are included in the Appendix I-A. They seem significant enough to warrant inclusion.

24. Page I.A-21, April 1981. Water from the french drain was pumped into SEP 207-B North and then periodically into the other two 207-B SEPs. The periodic transfer procedure is included in the Appendix I-A, but not in Section I.2.2.1 of the report. It seems significant enough to warrant inclusion.

25. Section I.2, Page I-6. This section states that "removal, treatment, and disposal of SEP 207-A sludge began on June 19, 1985....In 1985, Building 788 was constructed between SEPs 207-C and 207-A as a storage facility for the pondcrete waste containers. In 1988, an addition was made to the northern end of Building 788. This addition was constructed to

increase the pondcrete storage capacity." None of these events are included in Appendix I-A. They seems significant enough to warrant inclusion.

26. Section I.2, Page I-6. This section states that "placement of process wastewater into [the SEPs] ceased in 1986 due to changes in the RFP waste treatment operations." Page I-13 also refers to this event, although it is not included in Appendix I-A. It seems significant enough to warrant inclusion.

27. Section I.2.1.4, Page I-15. This section states that SEP 207-A sludge was used to produce the first pondcrete in 1986. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

28. Page I.A-23, October 1986. Appendix I-A states that a new pondcreting building was completed in October 1986. Section I.2.2.2 of the report states that Building 788 was constructed in 1985 to store pondcrete waste containers. It is unclear whether this is the same building. The building referenced in Appendix I-A should be identified.

29. Section I.2.1.2, Page I-13. This section states that SEP 207-A was relined in the fall of 1988. This is not included in Appendix I-A. It seems significant enough to warrant inclusion.

30. Section I.2.1.4, Page I-15. This section states that a leak detection system was installed for SEP 207-C in the late 1980s. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

31. Page I.A-23, March 1990. Appendix I-A states that "excess water in pond 207A was then to be transferred to Building 374 for evaporation." This implies that the transfer from the pond was conducted soon after the March 1990 transfer into the SEP. However, according to Section I.2.1.2, page I-13, the water was not transferred until the fall of 1992, more than 2 years later. The time of the actual transfer should be included in the appendix to avoid misleading the reader.

32. Section I.2.2.1, Page I-18. This section states that the interceptor trench system (ITS) water was diverted to the temporary Modular Tank System instead of to the SEPs beginning in

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April 1993. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

33. Section I.2.1.3, Page I-14. This section states that the 207-B SEPs were used to hold treated wastewater from June/July 1993 hot systems operations testing of the Building 910 evaporators. This information is not included in Appendix I-A. It seems significant enough to warrant inclusion.

2.2 PART II

General Comments

1. The placement of the figures and tables within the document should be checked. To eliminate confusion, the figures and tables should be placed within the document after they are first mentioned in the text, and in numerical order. It appears that this was attempted, but some have been misplaced.

2. Sections II.3 and II.4 of this report discuss only the nature and extent of contaminants identified as potential contaminants of concern (PCOCs). Limiting these discussions to PCOCs only may be inappropriate as several technical inadequacies in the PCOC selection process were also noted. Any revisions to the PCOC or contaminants of concern (COC) selection process and the resulting PCOC lists should be reflected in Sections II.3 and II.4 also.

3. The data summary tables provided in Section II.3.4, Subsurface Soil and Bedrock Analytical Results, are not data summary tables. These tables list location, sample number, start depth, end depth, QC (quality control) Code, QC Partner, Chemical, Result Lab Qualifier, Validation Code, Detection Unit, and Units. Much of this information is extraneous and should be presented in an appendix. It appears that database tables were reprinted rather than creating summary tables. Existing Tables II.3.4-3, II.3.4-4 and II.3.4-5 should be removed from the report.

   Data summary tables should be created and incorporated into the report. The information to be included is sample number, sample depth, and detected concentration. As a general rule, data summary tables should summarize the chemicals detected in subsurface soil and bedrock samples.

4. The text of Section II.3 refers to Section II.4 as providing a detailed analysis of the occurrence of the PCOCs discussed. The references are on pages II.3-226, II.3-242, and II.3-272. However, Section II.4, Nature and Extent of Contamination, does not discuss contamination in subsurface soils. As currently written, Section II.4 discusses only vadose zone and surficial soil contamination. A new subsection that specifically discusses the nature

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and extent of PCOCs in subsurface soil should be written and incorporated into Section II.4. The remedial investigation (RI) report cannot be considered complete until the nature and extent of contamination in all media investigated is discussed.

5. The conclusions and recommendations discussion in Section II.6 is incomplete. It only discusses surficial and vadose zone soil contamination. The discussion of subsurface soil contamination should also be summarized in this section.

6. Data presented and conclusions drawn in the site characterization reaffirm that water levels in the alluvium show a rapid response to spring precipitation. This conclusion contradicts the assertion in the document prepared by Engineering Science, Inc. (Solar Evaporation Ponds OU4 IM/ERA Evaluation of Potential Groundwater Fluctuations) dated April 11, 1994, that groundwater in the alluvium is not recharged directly by precipitation. The data presented in Volume II of the Draft IM/IRA Decision Document include hydrographs generated by automated water level monitoring stations at four alluvial wells in OU4. Three of the four hydrographs, particularly that of well 22-86, indicate a rapid response to precipitation events. The recharge mechanism proposed repeatedly in this document, downward flow through macropores in the vadose zone, explains why not every well would show a water table response to precipitation events. Macropores such as rodent holes, root channels, desiccation cracks, and utility trenches do not have a uniform distribution throughout the soil; therefore, wells that either do not intersect or are not located near macropores may not experience a localized water table rise after precipitation events. This document concludes on page II.6-5 that alluvial water levels measured with transducers appear to have shown a response to spring precipitation events at three monitoring locations and to a summer precipitation event at two monitoring locations. These observations lead to the conclusion that the increase in alluvial water level elevations at these monitoring locations is due in large part to macropore flow. This conclusion should be recognized in any analyses of water table fluctuations and their potential impacts, elsewhere in this document, or in future technical memoranda concerning OU4.

7. The volatile organic results of soil analyses conducted during this investigation are likely not usable because of the sampling strategy employed. Compositing soil samples dramatically increases the exposure of volatile organic compounds to the atmosphere, resulting in the loss of these compounds prior to analysis.

8. Aerosol dispersion is cited as a potential contaminant transport mechanism repeatedly in the discussion on the nature and extent of contamination. However, this transport mechanism is not discussed adequately in Sections 4 or 5 (Contaminant Fate and Transport).

9. The figures describing the distribution of contamination in the vadose zone are confusing. In addition, the rationale used to contour a single point on the figure is not clear and lends to the confusion.

10. The discussion of contaminant mobility is theoretically thorough and clear. However, there appears to be insufficient data collected to date to determine whether the contaminant transport theory is consistent with the trends observed in the actual chemical results. By comparing the expected contaminant behavior with actual results, it may be possible to determine the primary contaminant fate and transport process.

11. The contaminant transport and fate discussion focuses almost entirely on the potential transport of OU4 contaminants, while the fate of these compounds is not discussed. Based on the extent of information presented in the vadose zone conceptual model and the properties of the contaminants, general theories of the fate of these contaminants could be provided.

12. The vadose zone conceptual model discussion suggests that contaminant transport may be aided by preferential pathways in the subsurface such as fill material, subsurface channels, or macropores. Historical groundwater results from samples collected near the SEPs suggest there may be a source of chlorinated volatile organic compounds (VOCs) in the area of the SEPs. These observations suggest that the SEPs may be a source of VOC contamination to groundwater. However, the potential transport and fate of VOCs are not discussed in detail and the potential transport by preferential pathways is not described. The transport of mobile compounds by preferential pathways can result in the rapid dispersion of contaminants within an aquifer. Consequently, the potential transport and fate of VOCs should be discussed.

13. Part II, Volume 2 presents all the figures for Part II, Volume I, Section 3.0. Figures illustrating chemical concentrations in surficial soil and subsurface soil samples are included. For all these figures, the sample location numbers are not presented. Instead, sample location

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maps for both surficial soil and boreholes are provided as Figures II.3.2-2 and II.32.4-1. In order to confirm the presented sample results, the reviewer must review the location map and results map. It is recommended that the sample location number be illustrated on every map.

Specific Comments

1. Page II.1-3, First Paragraph. This paragraph describes the content of the various sections in Volume II. Section 4.0 is described as an evaluation of the lateral and vertical distribution of contaminants in surficial soils and vadose zone soils. The lateral and vertical distribution of subsurface soil contaminants are not mentioned but should be discussed in Section 4.0 and referenced in this introductory paragraph.

2. Section II.2.1, Page II.2-5, Last Paragraph (Second Bullet Item). The text states, "...identify boundaries of ponds and abandoned equipment and construction materials." The word "buried" should be added before "equipment" for clarification.

3. Section II.2.1, Page II.2-5, Last Paragraph. The text states, "This survey was reduced in scope from that described in the Phase I Work Plan based upon historical data review." A discussion of the findings, from review of historical data, that resulted in a reduction of scope for the ground penetrating radar (GPR) survey should be discussed in the text to provide an explanation.

4. Section II.2.1, Page II.2-5, Last Paragraph. The text states, "The locations of the GPR survey lines are shown in Figures II.2-1 and II.2-2." Survey lines are not shown in Figure II.2-1. The text should be changed to "The location of the GPR survey area and survey lines are shown in Figure II.2-2."

5. Section II.2.1, Page II.2-8, First Paragraph (First Bullet Item). The text states that the approximate locations of the original SEPs are shown in Figure II.2-3. The locations are not shown on this figure. The text should be modified to refer the reader to Figure II.3.1-15.

6. Section II.2.1, Pages II.2-8, II.2-15, and II.2-19 (bullet items). The text refers readers to Sections II.2.3.1 and II.2.4 for the analytical requirements and methods for surface and subsurface soil samples. Table II.2-4 would be a better reference for this information.

7. Section II.2.1, Page II.2-15, First Paragraph (Second and Fourth Bullet Items). Text should be added to refer the reader to Figure II.2-10 (12 boreholes and one deep borehole) and Figure II.2-3 (16 boreholes between ponds and around perimeter of IHSS 101).

8. Section II.2.3, Page II.2-45, Table II.2-4. Under the heading "Composite Collection/ Sampling Frequency" the last entry in this column is "each sample," yet the analytical parameters and the methods are not listed. Either the parameters and methods should be listed or "each sample" deleted.

9. Section II.2.3, Page II.2-48, Table II.2-4. The analytical method for "Particle Size - Hydrometer" was not listed, but should be. Also, "Saturated Hydraulic" should be listed as "Saturated Hydraulic Conductivity."

10. Section II.2.3, Page II.2-50, Paragraph 3. The text states that the results of the gamma survey were reported with "no additional modifications." This statement implies that the alpha and beta survey results were modified. If this is true, the "additional modifications" should be defined and the paragraph should be rewritten to eliminate this confusion.

11. Section II.2.3, Page II.2-50, Section II.2.3.2.2, Fourth Paragraph. This paragraph describes contamination monitoring. It defines radioactive contamination as "The presence of radioactive material where it is not wanted." Whether or not the contamination is wanted is immaterial to the definition. This definition is inaccurate and should be deleted from the text.

12. Section II.2.3, Page II.2-50, Paragraph 4. Under the heading Contamination Monitoring the purpose of radiation contamination monitoring is to determine the amount of exposure to (specific types of) radiation. After determining exposure one can, then, determine the amount of radioactive material that can "easily" be removed from a surface. The text should be written to reflect this.

13. Section II.2.3, Page II.2-51, Paragraph 2. The text states, "If Strontium-90 is known to be present, this unrestricted release criterion is decreased to 200 dpm/100cm^2." Text should be added to indicate that Strontium-90 emits both gamma and beta radiation and that it is known to be present at the RFP site.

14. Section II.2.3, Page II.2-53, Paragraph 5. The text states that the asphalt liner sample locations are shown in Figure II.2-3. The correct figure number is II.2-10. The text should be modified to provide the correct reference.

15. Section II.2.3, Page II.2-54, First Paragraph. The text states, "The sixth borehole was originally located in the vicinity of the clarifier but was relocated during the field investigation." A brief explanation for relocation of the borehole should be added to the text.

16. Section II.2.3.2.5, Pages II.2-54/55. In this section it appears that unconsolidated and bedrock materials were analyzed for two different sets of parameters. A list of analyses (with intervals) was provided only for unconsolidated materials. It is suggested that a similar analyses list be provided for bedrock materials.

17. Section II.2.4, Page II.2-56, Last Paragraph. The text states, "Table II.2-5 lists specific chemical constituents...." The text should be changed to, "Table II.2-5 lists specific chemical constituents in each parameter group for contract laboratory program (CLP) methods," for clarification.

18. Section II.2.4, Page II.2-69, Paragraph 3 and Page II.2-70, Paragraph 2. The text states, "Table II.2-5 lists the specific chemical constituents in each parameter group." The text should be changed to, "Table II.2-5 lists specific chemical constituents in each parameter group for CLP methods."

19. Section II.2.6, Page II.2-73, Paragraph 4. The text states, "Incomplete suites of logs were obtained for this borehole...time constraints RFP requirements...." It appears that this sentence is missing words between "constraints" and "RFP." The sentence should be rewritten to eliminate confusion.

20. Section II.2.7, Page II.2-77, First (only) Paragraph. These two sentences are confusing. The paragraph apparently states that quality control (QC) samples were not collected as per quality assurance and quality control (QA/QC) protocol. The paragraph should be rewritten to provide clarification.

21. Page II.3-9, First Sentence. This sentence summarizes the previous discussion of the depth at which groundwater was encountered during drilling. It states, "The groundwater levels found during drilling are only indicative of relative permeabilities of subsurface materials at each particular borehole, and frequently have little bearing on static water levels at those locations." It is not clear why the water level encountered during drilling is not indicative of the water level at that location. Further explanation, such as whether the water levels encountered during drilling are typically higher or lower than the static water levels and a description of the relative permeabilities, should be added to this paragraph.

22. Section II.3.3.1.1, Page II.3-33, Paragraph 4. The text states, "The proposed IM/IRA project to relocate the liners and cover a portion of the existing SEPs may dramatically affect the shallow water table in the SEPs area." This situation appears to be unlikely based on Section II.3.3.5.6, which concludes that draining SEP 207-A had little or no effect on water levels in adjacent alluvial and bedrock wells. This conclusion should be removed from the text unless it can be adequately supported.

23. Section II.3.2.1.2, Page II.3-55, Third Paragraph. This paragraph discusses the results of the gamma radiation survey and refers to Figure II.3.2-1. However, this figure shows only measurement station locations and not the results. An additional figure showing the (background subtracted) results should be included to accompany this discussion.

24. Section II.3.3.5.3, Page II.3-181, Paragraph 4. The text indicates that a value calculated by dividing the total amount of change of a water level in a well by the duration of the water level decline represents the hydraulic conductivity of the soil in the interval of the water level decline. These values are referred to as "relative hydraulic conductivities" and are listed in Table II.3.3-20 and used in Figure II.3.3-47 to depict zones of relatively high hydraulic conductivity. However, hydraulic conductivity is only one variable that may affect well water levels, others being hydraulic gradient, porosity, the well's position relative to localized sources and sinks of water, and (because the measurement periods were for various lengths of time at different times of the year) the temporal pattern of precipitation, evapotranspiration, and the manipulation of water levels in the solar ponds themselves. For instance, piezometer 45793, which is one of the two wells located in the "bulls-eye" of high relative hydraulic conductivity depicted in Figure II.3.3-47, is screened in colluvium/fill material directly above a subcropping siltstone that may receive recharge from Pond 207-C or from upgradient

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alluvium. Proximity to sources of water may explain large fluctuations in water levels at this well, instead of hydraulic conductivity, which is likely to be low in this soil. References to "relative hydraulic conductivities" estimated in this manner should be deleted from the text, as should Figure II.3.3-47.

25. Page II.3-224, Section II.3.4, First Paragraph. This paragraph begins the discussion of analytical results for subsurface soil and bedrock samples. It references the PCOC list provided in Table II.3.4-1. However, this table lists only PCOCs for the vadose zone. A new table listing PCOCs for subsurface soil and bedrock should be created and correctly referenced in this section.

26. Figure II.3.4-17. This figure presents the soil analytical results for zinc. Two of the values presented appear to be incorrect. Location 41193 had a zinc detection of 53.2 milligrams per kilograms (mg/kg) and location 41693 had a detection of 11.8 mg/kg. The figure shows 24.20 and 56.9 mg/kg, respectively. The figures should be carefully checked and the correct values listed.

27. Section II.3.6.1, Page II.3-311, Paragraph 2. This section presents the audit reports and corrective action documents associated with the Phase I remedial investigation and feasibility study (RI/FS). However, there are only two corrective action documents presented and six deficiencies listed. Documentation of corrective actions should be addressed for each deficiency listed. For example, holding times of nitrate samples were exceeded; however, no documentation of a corrective action such as resampling is presented.

28. Section II.3.6.2.4, Page II.3-318. The relative percent differences (RPD) were calculated using the detection limit (DL) for samples with results measured to below the DL. The normal procedure used to calculate the RPD for samples with results at the method DL is to use one-half the value of the DL. The RPDs for the samples with results measured below the DL should be recalculated.

29. Section II.3.6.3.3, Page II.3-345, Paragraph 4. This section states that no vadose zone aqueous samples were collected. However, vadose zone implies a nonaqueous soil strata. An explanation of the origin of a vadose zone aqueous sample should be provided.

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30. Page II.4-53, Paragraph 1. The distribution of calcium appears to be quite variable and may not be the result of extensive calcium contamination and high mobility. Alternatively, the observed distribution may result from the compositing samples of various geologic units and possibly construction fill material. The data should be reevaluated and the text updated.

31. Section II.5, Page II.5-14, Paragraph 4. Nitrogen species are used by organisms during the formation of proteins. Often, high levels of nitrogen can lead to dramatic increases in biological populations. This biological mechanism would appear to be the dominant fate process controlling nitrogen species in ponded water and surface soil environments. In addition, large amounts of available nitrogen in near-surface soils may lead to increased rates of biodegradation or adsorption of other contaminants. The fate of nitrogen in soils should be discussed and the biological mechanisms included in the discussion.

32. Section II.5.2.1, Page II.5-17, Paragraph 1. This paragraph notes that infiltration water may follow preferential pathways during migration in the vadose zone. The migration of infiltration water through these preferential pathways would affect the fate and transport of soluble VOCs and should be discussed.

2.3 PART III

General Comments

1. The term PCOC is used throughout the document to indicate both chemicals detected at OU4 and chemicals selected using the COC selection process. The term PCOC should be used consistently to refer to those chemicals selected using the COC selection process.

2. In the COC selection process for inorganic chemicals, four statistical tests are used to compare site concentrations of inorganic contaminants to background levels. While the explanation of the statistical methods used is comprehensive, it is unclear which statistical test will be used to determine whether a chemical exceeds background levels if results of the four tests are conflicting. If levels of a chemical are shown to be greater than background by any of the tests, it should be retained as a PCOC.

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3. According to agreements made at the November 15, 1993 meeting between DOE, U.S. EPA, and the Colorado Department of Health (CDH), organic constituents detected in vadose zone soils in historical data would be retained as PCOCs if they were detected in surface soils during the (RFI/RI) program or exceeded their readjusted preliminary remediation goals (PRGs). It is unclear whether this has been done. The text should be clarified to reflect agreements made between the agencies.

4. Appendix III.A discusses how qualified data were evaluated, but does not explain how "blank" qualified samples were evaluated or whether there were "blank" qualified samples in the data set. This should be discussed in Appendix III.A.

5. The text should clearly state which soil depth interval is considered surficial soil. It should also state that remedial action for surficial soil will be based on a residential exposure scenario and on a commercial/industrial exposure for vadose zone soils. It is important to clarify this distinction because PRGs and COCs have been separately developed for surface and subsurface soils because of different exposure assumptions. If, in the future, all decisions regarding soil remediation will be based on a commercial/industrial exposure scenario then COCs and exposure concentrations will need to be revised.

Specific Comments

1. Section III.2.1, Page III-4. This section indicates that silicon was eliminated as a PCOC because it is an essential human nutrient. This is incorrect. Silicon is not typically considered an essential nutrient. Essential nutrients include calcium, copper, iron, manganese, magnesium, phosphorus, potassium, sodium, and zinc. These nutrients can be eliminated as PCOCs if intakes will not exceed the recommended daily allowance or safe and adequate daily intakes (NAS 1989). Silicon should not be eliminated on this basis.

2. Page III-6, Figure III.2-1b. This figure presents part of the COC selection process. One of the criteria is "Does a PCOC exceed PRG or background only outside OU4?" This statement is unclear and is not explained in the accompanying text. The statement should be completely explained, as some chemicals could be eliminated as COCs using this ambiguous criterion.

3. Page III-10, First Paragraph. The text states that ingestion of fruits and vegetables was not considered in determining PRGs for the residential scenario. Although significant amounts of agricultural development may not occur, it is likely that fruits and vegetables would be grown by residents. This pathway should be included in the development of PRGs and in the baseline risk assessment.

4. Page III-10, Second Paragraph. This paragraph states, "Longer term exposure of industrial/commercial workers was not retained in the final PRG evaluation because it was not relevant for PRG comparisons." However, on page III-8, the text states, "Commercial/ industrial land use is considered to be the most probable future land use and was therefore considered in developing PRGs for OU4." These statements seem contradictory and imply that commercial and industrial PRGs would not be considered in making risk management decisions. Although CDH guidance requires that residential exposures and PRGs be presented in the IM/IRA, PRGs corresponding to the most likely land use are important in risk management decisions and for public information. PRGs for commercial and industrial land use should be calculated and presented along with those for the residential scenario.

5. Page III-11, Second Paragraph. The paragraph discusses the conversion of oral toxicity values to dermal toxicity values, but does not adequately describe the methodology. Oral toxicity values are usually based on the administered the dose of a chemical, not on the absorbed dose. Oral toxicity values should be adjusted, therefore, for gastrointestinal (GI) absorption before being used to estimate risk from dermal exposures, which are also expressed as absorbed doses. To adjust oral reference doses (RfDs), the RfD is multiplied by the GI absorption factor. Cancer slope factors (CSFs) are divided by the absorption factor. This procedure is outlined in Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) (RAGS-A, EPA 1989a), and should be more thoroughly described in this paragraph.

This paragraph does not discuss dermal absorption factors, which are different than GI absorption factors. Dermal absorption factors are used in estimating absorbed dose of a contaminant in soil. Both dermal and GI absorption factors should be presented and references for this information should be cited.

6. Section III.2.2.1.3, Page II-11. This section describes how a target risk level was developed for carcinogens prior to calculation of chemical-specific PRGs. The method described involves dividing EPA's *de minimis* risk level of 1.0E-6 by the number of carcinogens in a medium that affect the same target organ. This method does not conform to EPA guidance (EPA 1989a). It is inappropriate to aggregate cancer risks based on target organs; this methodology is appropriate for noncarcinogens only. Target risk for carcinogens should be calculated by dividing 1.0E-6 by the number of carcinogenic PCOCs in a medium. This is consistent with the theory that carcinogenic risks are additive and there is no safe threshold of exposure to carcinogens.

7. Page III-12, Table III.2-2. This table presents PRGs for PCOCs in surficial and vadose zone soils. PRGs based on both carcinogenic and noncarcinogenic effects are included in the table. For chemicals that pose both carcinogenic and noncarcinogenic effects, and therefore have both carcinogenic and noncarcinogenic PRGs, a designation should be made as to which PRG was used for comparison. The lower of the two PRGs should be used to determine COCs, and the table should indicate this.

   Additionally, this table does not include benzo(g,h,i)perylene, bis(2-chloroethyl)ether, or phenanthrene, which were detected in surface soil according to Table III.A-6 (Appendix II.A). It is not clear why these chemicals were eliminated as PCOCs. They should be included in Table III.2-2 even if they will be evaluated qualitatively.

8. Page III-14, Second Paragraph. The text describes the selection of COCs by comparison of PCOC concentrations to PRGs. The PCOC concentrations were either the 95 percent upper confidence limit of the mean (UCL), the 95 percent upper tolerance limit (UTL), or the maximum observation. It is not clear which value was used for comparison to PRGs. The text should describe which values were used for comparison, and the circumstances under which they were used.

9. Page III-14. These sections describe PRG and COC development and exposure pathways. Contaminant leaching potential is not evaluated as part of PRG development or discussed as an exposure pathway. Soil PRG (cleanup level) development should include calculations of the maximum contaminant levels in soils so that resulting groundwater contamination levels are protective and groundwater applicable or relevant and appropriate requirements (ARARs)

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are not exceeded. In addition, this evaluation could further define site hazards and provide a rationale for selecting appropriate remedial technologies. The text should calculate action levels based on leaching potential and compare the action levels to risk-based PRGs for soil ingestion, dermal contact, and inhalation. In addition, the text should discuss potential exposure pathways resulting from soil contaminants leaching to groundwater by means of infiltration.

10. Page III-14, Last Paragraph. This paragraph states that in order to determine what PCOCs may be contributors to contamination in groundwater at OU4, the catastrophic dissolution and MYGRT models were used. This statement and information provided in Appendix III.D do not address the potential for PCOCs to contaminate groundwater through leaching caused by precipitation. They address only groundwater impacts caused by a rising water table. As stated above, the text should also discuss the potential for soil contaminants to leach into groundwater by way of infiltration and should calculate action levels based on leaching potential from infiltration. This information will assist in delineating the area of concern (AOC) and provide a rationale for remedy selection.

11. Page III-14, Last Paragraph. This paragraph states that to determine what PCOCs may be contributors to contamination in groundwater at OU4, the previously described catastrophic dissolution and MYGRT models were used. The text should reference where the catastrophic dissolution and MYGRT models were previously described.

12. Page III-16, Table III.2-3. This table lists COCs for surficial and vadose zone soils based on the risk analysis. Uranium and strontium are presented in this table, along with their PRGs in mg/kg. However, the PRGs for these two chemicals are not presented in Table III.2-2. The tables should be consistent. The PRGs for uranium and strontium should be included in Table III.2-2.

13. Page III-17, Table III.2-3. This table presents radionuclide COCs and COCs without PRGs. The COCs without "target levels" listed in this table are benzo(g,h,i)perylene, lithium, sodium, and phenanthrene. These four chemicals are not listed in Table III.2-2 as PCOCs. The tables should be consistent, and these chemicals should be added to Table III.2-2.

14. Page III-18, Section III.2.4.4. The text states that soil will be excavated "to the depth of the mean historic high ground water elevation or until a level of contamination is reached that is below the vadose zone PRGs or below a concentration that is determined to be protective of groundwater." Risks from groundwater exposure have not been included in the PRG calculations nor are they planned to be assessed as part of the baseline risk assessment. It is unclear how a contaminant level in groundwater that does not endanger human health can be calculated if the risks from groundwater exposure will not be quantified. Similarly, it is unclear how a contaminant level in soil that would not leach to groundwater at significant levels can be determined if groundwater exposure is not assessed. Exposure to groundwater contaminants should be assessed, at least in the baseline risk assessment.

15. Page III-18a, Figure III.2-3. The figure illustrates the AOC; however, the AOC is discontinuous. Accompanying text should describe why this area is discontinuous. Presumably, the area below the unconsolidated material-bedrock contact projection is excluded because it is contaminated by groundwater seeps. Therefore, it is presumed that soil will not be remediated until groundwater remediation is underway. The text should clarify this matter. Furthermore, any contaminated vadose zone soils in this area not affected by groundwater seeps should be considered for inclusion.

16. Page III-21, Last Paragraph. The text states that soil flushing was eliminated based on low soil permeabilities and high clay content. Soil permeabilities can be enhanced and clay difficulties can be overcome by using a technology commonly referred to as soil mixing. Soil mixing employs large augers to mix soil and increase permeability, and could be applicable. Therefore, in situ soil flushing should be evaluated in conjunction with soil mixing.

17. Page III-30, Second Paragraph. The text states that the selection and design of the final cover system components will depend on the nature and concentration of the contaminants present; the level of performance required to ensure overall protection of human health and the environment; and the governing regulatory standards. The reports have identified two of the three components. However, the level of performance required for the engineered cover system to ensure overall protection of human health and the environment has not been specified. This level could be specified through modeling, column testing, and evaluating groundwater data. The text should clearly specify all performance objectives so that the most appropriate remedy can be selected.

18. Page III-33, Fourth Paragraph. The decision document indicates that a disadvantage of slurry walls or horizontal barriers is that their integrity may be damaged by groundwater contaminants. It is not clear which groundwater contaminants at OU4 would adversely effect slurry walls and horizontal barriers. The document should clarify which contaminants could adversely affect slurry walls at OU4.

19. Page III-34, First Paragraph. The text states that a subsurface liner and leachate collection system (LCS) could be used to reduce the possibility of leaching and migration of contaminants from a rising water table. The text then states that a subsurface liner will prevent groundwater from contacting the waste zone, while the LCS will treat any leachate produced from infiltration. The text further states that a disadvantage of the liner and LCS is that the LCS is not passive and will be costly. The requirement for passive systems should be discussed, as other monitoring activities and groundwater treatment activities at RFP are not likely to be passive and could be used in the OU4 IM/IRA.

20. Page III-34, Second Paragraph. This paragraph states that a subsurface drain could be employed to divert rising groundwater into the interceptor trench system (ITS). The text should describe the fate of the water once it enters the ITS since this information may alter the feasibility and cost of the subsurface drain.

21. Page III-73, Second Paragraph. The description of general response action (GRA) III (in situ treatment) alternative B (consolidation of contaminated debris/waste) indicates that a subsurface drainage layer would be installed above treated (stabilized) soils to protect untreated liners from potential contact with rising water. It is not clear how such a layer above the stabilized material (which is generally a solid monolith) would function. It is also not clear how the layer will function since it is located above the mean seasonal high water table elevation. The purpose for this layer should be clarified.

22. Section III.3.3.2, Page III-65. This section describes GRA II (containment) and states that alternatives A and C include a subsurface drain. The inclusion of a subsurface drain requires all contaminated media to be excavated and stockpiled before constructing the subsurface drain. More rationale should be provided for not installing a liner before returning contaminated media into the excavation. A liner is a standard component of disposal cells and should be considered since all wastes will be excavated. Minimizing impacts to the ITS is a

stated objective of the IM/IRA and a liner could prevent leachate from entering the ITS. The document states that liners and LCS are not desirable since the system will no longer be passive. However, active groundwater treatment will likely occur at RFP and leachate collected from OU4 could be handled with little additional cost.

23. Page III-78. The description of GRA V (contaminated media/waste removal with ex situ treatment) indicates that treated soils can be returned to OU4 as backfill. The information should specify under what circumstances treated soil would be used as backfill. The description later states that GRA V involves complete removal of all contaminated media for ex situ treatment and either on site storage or off site treatment/disposal. It should clarify whether the on site storage or off site treatment/disposal applies to all the treated media or only to treatment residues.

24. Appendix III.A, Page III.A-1, Section III.A.1. This section describes data management for the OU4 RFI/RI analysis, and states, "Not all soil data used in this analysis have been validated... A fully validated data set will be used to support the baseline risk assessment." Unvalidated data should not be used in the IM/IRA risk analysis. The selection of COCs and the calculation of chemical-specific exposure concentrations to compare against PRGs requires validated data. To the extent that unvalidated data have been used for the risk analysis, additional uncertainty has been added to the results of the COC selection and PRG comparison results. If validation of the data reveals unusable data or changes the data set significantly, the COC selection process and PRG comparison may need to be reevaluated.

25. Appendix III.A, Page III.A-3, First Paragraph. The text states that data qualified with a "UJ" code was treated as a nondetect. This statement requires further clarification, because data qualified with "UJ" can indicate that a chemical was detected below the contract required detection limit (CRDL) but above the sample quantitation limit (SQL). In that case, the chemical should be considered a true detect and included in calculations at the reported value. The value should also be included in the frequency of detection count as a detect. The "UJ" qualifier should be more completely explained to ensure that the frequency of detection counts and estimated exposure concentrations are accurate. Since this is particularly important the samples should be considered true detects because chemicals were eliminated as COCs based on frequencies of detection that were less than 5 percent.

26. Appendix III.A, Page III.A-5, Section III.A.3. This section discusses the exploratory data analysis of OU4 data. The accompanying tables do not summarize all detected chemicals, but include only those determined to be PCOCs after some COC selection criteria were applied to the data. Summary tables of all detected chemicals at OU4 should be included in this appendix and the text. It is not possible to verify COC selection without tables of all detected chemicals which include the CRDLs, SQLS, frequency of detection, minimum detected concentrations, maximum detected concentrations, and the arithmetic or geometric mean concentration of every detected chemical.

27. Appendix III.A, Page III.A-6, Figure III.A-1. The figure presents the PCOC identification and quantification process used for inorganic chemicals and radionuclides. The first criterion is, "Are OU4 analyte concentrations significantly different than background data?" Neither the text nor the table indicates which of the four statistical tests will be used to determine whether a chemical exceeds background concentrations. If a chemical is found to be significantly greater than background using any of the four tests described, it should be considered a PCOC.

The chart also indicates that if the answer to the above question is "no," then the results will be reevaluated. A footnote refers the reader to Appendix III-C and the text for "further details on other comparison and statistical 'tools'." Appendix III-C provides only the toxicity profiles of the PCOCs, and the text does not describe the reevaluation. A description should be included in the text. The footnote should be corrected in this figure and in Figure III.A-2.

28. Appendix III.A, Page III.A-7, Figure III.A-2. The figure presents the COC selection process for organic chemicals detected at OU4. The third step (presented in the middle of the figure) states, "Are at least 9 OU4 analyte sample results > 0.05 [Detection Limit] DL?" This criterion should be further explained, because it is not clear why this distinction needs to be made, or why it is made only for organic contaminants.

29. Appendix III.A, Page III.A-8, Second Paragraph. The paragraph states that reported values for nondetect results were used when conducting nonparametric statistical tests and distribution fitting, but that one-half the reported value for nondetect results was used in computing summary statistics. It is unclear why the same data set was not used for all

procedures, or whether the inclusion of nondetect results could have invalidated the statistical tests. These issues should be clarified in the text.

30. Appendix III.A, Page III.A-9, Table III.A-2. This table presents the results of the PCOC selection criteria for inorganic chemicals detected at OU4. One of the columns in this table, and in Tables III.A-3, III.A-4, and III.A-5, indicates whether a chemical was detected at a concentration greater than 10 times the background concentration. This comparison is not described in the text and is not included in the COC selection criteria outlined in Figure III.A-1. The benefit of this comparison should be described in the text.

Additionally, Tables III.A-2 through III.A-9 include a column to indicate whether historical evidence of the chemical's use at OU4 is available. A footnote should be added to these tables stating that historical evidence will only be used qualitatively and is not a COC selection criterium. Additionally, descriptions of historical use should be clarified. For example, in Table III.A-4, this column is rarely marked "yes," but in the final column of the table, the remarks state, "Historical use evidence based on OU4-specific operations data." It is unclear whether the remark indicates that past use of the chemical is unknown; known to have been used; or known not to have been used. Historical use descriptions should clearly indicate whether documentation of use of a chemical is available.

31. Appendix III.A, Page III.A-10, Table III.A-3. The table presents a summary of evaluation criteria results for inorganic chemicals in vadose zone soil at OU4. Throughout the column titled "Remarks," the table states "max. data in Pond 20??? area." This remark should be explained in a footnote or in the text because its meaning is unclear.

32. Appendix III.A, Page III.A-24, Fourth Paragraph. The third sentence of this paragraph states, "This test is equivalent to the Mann-Whitmey/Wilcoxon Rank Sum Test if neither data set contains no non-detects." The word "no" should be removed from the sentence. The sentence is incorrect as written.

33. Appendix III.B, Tables III.B-1 through III.B-8. The exposure parameters used in these tables should be referenced. The equations used to calculate PRGs should also be provided on each table. The tables are incomplete as presented.

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34. Appendix III.B, Table III.B-5. The equation used to calculate PRGs should be presented in the table. Exposure factors should be referenced, particularly the ingestion rate for soil, which is expressed in units of milligrams-year-day and does not appear to be an EPA default exposure value. It seems that some exposure parameters may not have been presented in the table, including inhalation exposure parameters. This table and Table III.B-5 should be corrected.

Additionally, the slope factors presented in this table for uranium-235 and -238 are incorrect. They should be corrected and risks recalculated as necessary. The slope factors presented for tritium could not be verified; they do not appear in HEAST (EPA 1993a) and the source of this information was not cited. These inaccuracies occur in Table II.B-6 as well, and it should also be corrected.

35. Appendix III.B, Table III.B-7. Some toxicity values in this table were incorrect or unverifiable. For example, the RfD for 2-butanone is 5E-2 mg/kg-day, not 0.6 mg/kg-day. The RfD for Arochlor-1254 is unverifiable. The values should be corrected as necessary.

36. Appendix III.B, Table III.B-8. The slope factors presented in this table for uranium-235 and -238 are incorrect (EPA 1993a). They should be corrected here and in the PRG calculation tables. Additionally, for all radionuclides with available information, the slope factors associated with the radionuclide and its radioactive decay chain should be used. These values are marked with the suffix "+D" in HEAST (EPA 1993a). According to HEAST (EPA 1993a), "in the absence of empirical data, the "+D" values for radionuclides should be used unless there are compelling reasons not to." It does not appear that "+D" values have been used. This table and the corresponding PRG calculation tables should be revised as necessary.

37. Section III.D.2.1 through III.D.2.3, Pages III.D-16 through III.D-2. For comparison, literature values of distribution coefficients (K_d values) for metals and radionuclides should be used to evaluate the conservativeness of the approach presented in these sections. The comparison should help determine if the model presents realistic results.

38. Appendix III.G, Page, III.G-1, Third Paragraph. The paragraph states that the analysis does not consider a reclamation-type cover because "the engineered cover will have to isolate contaminated soils that exceed PRG concentrations. In addition, the engineered cover may also provide closure for waste that may not be fully characterized. Therefore, the reclamation cover may not adequately meet the closure requirements of the Colorado Hazardous Waste Management Regulations." It is not clear how the exceedance of risk-based PRGs and the presence of uncharacterized waste influence the reclamation-type cover's ability to meet closure requirements. This matter should be clarified and the covers should be evaluated with respect to clearly specified closure requirements and performance objectives.

39. Appendix III.G, Page III.G-5, Second Paragraph. The paragraph states that contaminated liners, utilities, and Building 788 debris cannot be consolidated under the capillary-break cover unless they are below risk-based PRGs. The basis for this requirement should be clarified, since no action is required for OU4 contaminated soils that are below risk-based PRGs. The document should also clarify why this requirement does not apply to the 1,000-year cap.

40. Appendix III.G, Page III.G-11, Second Bullet. This bullet states that a disadvantage to the capillary-break engineered cover is that it is least effective in limiting infiltration. Modeling has indicated that groundwater impacts resulting from infiltration would be insignificant, which implies that limiting infiltration beyond evapotranspiration's capability may not be warranted. The text should clarify this inconsistency.

41. Appendix III.G, Page III.G-11, Third Bullet. This bullet states that the capillary-break cover may not meet state closure requirements because soils beneath the SEPs have low hydraulic conductivities (1x10-03 cm/day [1.1x10-8 cm/sec] to 1x10-09 cm/day [1.1x10-14 cm/sec]) and the cover materials may not be able to be constructed with an equal or lower permeability. The soils beneath the SEP waste are the sands and gravels associated with the subsurface drainage layer. The capillary-break cover will likely have a lower hydraulic conductivity than the subsurface drainage layer.

42. Appendix III.G, Attachment A. The cost estimates do not account for some of the differences among options. The only significant difference in costs among the three alternatives appears in indirect field costs and cover installation costs. It does not appear that costs for radiation

surveys, security, hillside stabilization, and off-site disposal reflect the differences in volumes of material required for each option and the length of time required for each option. The estimates should reflect differences in options so they can be accurately compared.

43. <u>Appendix III.G, Attachment A</u>. Several aspects of the cost estimate should be clarified. Thirty million dollars for a engineered cover may appear excessive without supporting rationale. Examples of additional rationale that could be provided are listed below.

- Approximately $6 million are required for indirect field costs. Approximately $4 million out of the $6 million is for three trucks and drivers. This appears excessive and should be verified.

- The estimate includes $2.5 million for engineering costs. This seems excessive for a design that basically consists of earthwork. No electrical, mechanical, or control system designs are required. It also seems excessive since the design is based on a previously prepared design for the Hanford Reservation in Washington. These engineering costs seem excessive and should be verified.

- The estimate includes more than $5.5 million for construction management, project management, and contractor construction management. For a relatively simple construction project, this estimates seem excessive and more rationale should be provided.

- The $7 million contingency should be more fully justified. Given the amount of detail provided in the estimate and the straightforward nature of the project, this large contingency seems excessive.

2.4 PART IV

General Comments

1. The OU4 IM/IRA decision document is very short-sighted, and narrow in focus. Decisions made in the document do not consider integrating OU4 actions with other remedial actions that will be required at other RFP OUs. For example, the remediation proposed could be altered with minimal effort to address similar wastes from other OUs. In addition, any leachate collected from OU4 could be easily integrated with other groundwater treatment systems.

While a more broad, plant-wide perspective may delay OU4 actions temporarily, the environmental restoration process for all of RFP could be expedited significantly. Furthermore, significant savings of money and resources could potentially be realized with protection of human health and the environment still remaining a principal goal.

2. Adequate rationale has not been provided for the selection of the 1,000-year cap. The main objectives of the proposed OU4 IM/IRA remedial alternative are, presumably, to (1) isolate OU4 wastes by eliminating upward exposure pathways, and (2) protect groundwater from OU4 contaminants. The proposed 1,000-year cap should effectively eliminate upward exposure pathways by isolating contaminants, preventing direct contact with wastes, and minimizing contaminant migration from erosional forces. However, a simpler soil cover would also function equally as well to eliminate upward exposure pathways.

The 1,000-year cap/subsurface drain is also proposed to protect groundwater. Although the 1,000-year cap will reduce infiltration, the role of the 1,000-year cap in protecting groundwater is not clear. Modeling results discussed in Part IV and in previous submittals indicate that groundwater impacts resulting from precipitation infiltrating through the OU4 contaminants are not significant. However, a 1,000-year cap designed specifically to reduce infiltration is proposed in conjunction with sophisticated vadose monitoring. More rationale is required to justify the selection of this strategy, along with a discussion of the benefits of using such an extensive cap and monitoring system. Some attempts have been made to justify selecting the cap and are discussed in detail below.

(a) Throughout Parts III and IV, the document implies that the regulations require the cap to last 1,000 years. For example, on page IV-3, the document states that "the engineered cover system, in conjunction with the physical site characteristics, must protect human health and the environment for 1,000 years as required by the State of Colorado hazardous waste landfill siting criteria (6 CCR 1007-2)." This statement is misleading and the document's general interpretation of the regulation is questionable. The siting criteria states that the geological ~~and~~ hydrogeological conditions of a site where hazardous wastes are to be disposed of should isolate wastes from natural environmental pathways that could result in exposure to the public for 1,000 years. If a preferential environmental pathway is not of concern to human health and the environment, then there is no need to provide protection for that particular

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preferential environmental pathway. It seems that the requirement is incorrectly being used as a design criterion for engineered covers to justify the use of the Hanford design.

The siting requirement could more appropriately be used to justify relocating the disposal cell to an area where groundwater elevation rise and slope stability are not concerns.

(b) Appendix III.G evaluates three engineered cover alternatives including a 1,000-year cap, a RCRA-compliant cover, and a capillary-break engineered cover. The evaluation concludes that the 1,000-year cap is the most suitable. However, several aspects of the analysis are inadequate, as enumerated below.

(1) The appendix states that contaminated liners, utilities, and Building 788 debris cannot be consolidated under the RCRA or capillary-break cover unless they are below risk-based PRGs. The basis for this requirement should be clarified, since no action is required for OU4-contaminated soils that are below risk-based PRGs. The document should also clarify why this requirement does not apply to the 1,000-year cap.

(2) The appendix states several times that the capillary-break engineered cover is least effective in limiting infiltration. However, modeling has indicated that groundwater impacts resulting from infiltration would be insignificant, which implies that designing a cap that minimizes infiltration beyond evapotranspiration's capability may not be necessary.

(3) The appendix states that a capillary-break cover may not meet state closure requirements because soils beneath the SEPs have low hydraulic conductivities (1x10-03 centimeters per day [cm/day] [1.1x10-8 centimeters per second [cm/sec]] to 1x10-09 cm/day [1.1x10-14 cm/sec]) and the cover materials may not be able to be constructed with an equal or lower permeability. The soils beneath the SEP waste are the sands and gravels associated with the subsurface drainage layer. The capillary-break cover will likely have a lower hydraulic conductivity than the subsurface drainage layer.

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(4) The appendix states that the cost of the 1,000-year cap is similar to the other covers because of the additional sampling required for the other two options evaluated. However, it is not clear why this additional sampling is required for two of the options and not for the 1,000-year cap. In addition, the estimate for the cost of construction for the 1,000-year cap is actually twice the RCRA cap and the capillary-break cap. To state that costs are essentially the same for all the caps is misleading, as the inflated management, contingency, and preparation costs mask the differences in actual capping costs.

(5) The appendix states that the analysis does not consider certain covers because "the engineered cover will have to isolate contaminated soils that exceed PRG concentrations. In addition, the engineered cover may also provide closure for waste that may not be fully characterized. Therefore, the reclamation cover may not adequately meet the closure requirements of the Colorado Hazardous Waste Management Regulations." It is not clear how the exceedance of risk-based PRGs and the presence of uncharacterized waste influence a cover's ability to meet closure requirements. The disposal of uncharacterized waste should be evaluated in more detail.

3. EPA believes that the siting requirement for 1,000 years protection can be met at OU 4 with a cover design that is effective in meeting the closure requirements for hazardous waste landfills. Since infiltration is not a problem to ground water, there is no need to design a cover system that prevents infiltration for 1,000 years. A RCRA cover system should be enough to provide protection for 1,000 years for upward exposure pathways such as inhalation, ingestion and dermal exposure. In addition, a RCRA cover system may offer design advantages over the proposed 1,000-year cap design. The resulting weight of the 1,000 year cover could result in slope stability problems, and the integrity of the cover may be difficult to maintain. In addition, the pyramid-shaped disposal area will be 55 feet high with 20 percent slopes. This cover profile may be more susceptible to erosion and abrasion and may not function with minimal maintenance relative to the RCRA cover. A RCRA cover

lesser material requirements and a resulting lower profile and more gradual slopes may not be as prone to erosional forces and may function with less maintenance. These considerations should be evaluated in the document.

4. Siting requirements (6 Colorado Code of Regulations [CCR] 1007-2) require a bottom liner unless it can be demonstrated that it is not necessary. The design document cites vadose zone leaching (VLEACH) model results as the rationale for not including a bottom liner. If uncharacterized waste will be disposed of under the cover, VLEACH results are not adequate to justify not constructing a bottom liner and a leachate collection system. The document should evaluate whether uncharacterized waste should be disposed of as part of the IM/IRA and describe ramifications from its disposal on siting requirements and closure requirements.

5. The document appears to be biased toward a 1,000-year cap, similar to the cover implemented at Hanford. This type of cover would be better justified if the disposal cell is relocated to a more suitable area that meets the intent of the siting requirements; that is, not near shallow groundwater, and in an area that does not exhibit potential slope instabilities. The document should evaluate increasing the size of the relocated disposal cell to accept waste from other RFP environmental restoration activities.

6. The document states that the subsurface drain/control system will be selected and designed during the conceptual and title design stages based on the selected engineered cover design, hydraulic calculations, and performance monitoring. However, several options are available to address rises in groundwater elevation and each has different advantages and disadvantages. For example, a subsurface drain requires all soil to be excavated and an artificial vadose zone to be constructed prior to drainage layer placement. Other options, such as relocating the disposal cell or an upgradient interceptor trench, may have advantages over the subsurface drain strategy. Furthermore, the document does not show whether the subsurface drain will be effective under assumed hydraulic conditions for 1,000 years. The document should evaluate whether a potential solution will be effective before the decision is made to use it. Therefore, this document should evaluate options to solve the rising groundwater problem, rather than deferring it to the design stage.

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Specific Comments

1. Page IV-4, First Paragraph. This paragraph states that the excavation can be terminated when the mean historical high groundwater table elevation is encountered or when soil concentrations for all the COCs are less than PRG concentrations established to be protective of groundwater. DOE is proposing to model catastrophic dissolution of contaminants followed by transport using the computer model MYGRT to develop PRGs that protect groundwater. The text then states that the volume of soils that require excavation may be reduced. This strategy can only reduce soil volume for excavation areas that are located below the footprint of the final cover. For areas located outside the cap footprint that are to be consolidated, this strategy could mean that soils will be left in place even though they contain contaminant levels that are above risk-based PRGs. The text should be revised for to reflect the limitations of the proposed strategy.

2. Page IV-23, Third Paragraph. The paragraph states that leachate produced under unsaturated conditions is innocuous and that therefore it is best to allow infiltrated precipitation to drain through the subsurface drainage system rather than to allow it to accumulate on a liner and create saturated conditions. The document should clarify that if a liner were employed in conjunction with a leachate collection system, accumulation would not occur. The document should then describe why a collection system is not warranted and consider that the proposed monitoring system is not completely passive and any groundwater treatment required at RFP will not be passive. Any water collected by a LCS could be treated by another OU with little additional cost.

3. Page IV-23, Fifth Paragraph. This paragraph states that excavation will be terminated when the historical mean seasonal high water table elevation is reached. The document should consider further excavation if this mean seasonal high water table elevation is reached and contaminated soil (above groundwater-protection PRGs) is still unsaturated. This strategy could reduce leachate generation and migration from high seasonal groundwater elevations.

4. Page IV-37, Figure IV.3-9, Page IV-41, and Drawing 123. The figure depicts the final engineered cover and shows a sand layer below the gravel subsurface drainage layer. The purpose of this sand layer is not evident. The document should clarify the purpose of this bottom layer of sand.

5. Page IV-37, Figure IV.3-9. The figure depicts the final engineered cover and shows existing soils or contaminated media located below the subsurface drain. The document should clarify whether contaminated media will be located below the subsurface drain.

6. Page IV-39, Sixth Paragraph. The text states that sand and gravel filters below the general backfill will prevent overlying soils from migrating into the biotic barrier. However, the document does not state that filtering is required for the capillary break. The document should clarify the purpose of this filter layer, as it is not clear why biotic barrier effectiveness would be influenced by clogging voids.

7. Page IV-39. This page discusses general backfill for the cover. The effects of subsidence on cover material requirements are not provided. The text should provide calculations that predict settlement due to the weight of the cover. Settlement should be predicted to evaluate the need to surcharge the area before the asphaltic layer is constructed and to assist in setting the elevation of the subsurface drain.

8. Page IV-54, Last Paragraph. This paragraph states that HELP model results indicate that the engineered cover will significantly reduce infiltration to levels below 0.1 inches per year. The document should specify what infiltration rate is required to be protective since modeling indicates contaminants present are not mobile.

9. Section IV.3.1.4, Page IV-57, Drawings. The document provides information about the subsurface drain design. The drawings depicts the subsurface drain as emptying into the ITS. The drawings should provide details about the location where the ITS discharges. Drawings and calculations should also verify that the drain will not be submerged under elevated water table conditions. Submergence would render the drainage system ineffective. The drawings should show a profile of the subsurface drain/ITS ditches and trenches and a provide a hydraulic energy grade line which illustrates that the drain will function as intended under assumed hydraulic conditions.

10. Section IV.3.1.4, Page IV-58. This section states that DOE may install a groundwater trench upgradient to prevent lateral groundwater flow from contacting contaminated materials. The text then states that this trench may not be necessary, because the subsurface drain may alone be adequate. Although this assumption may be accurate, it may also be possible that an

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upgradient diversion trench may alone be sufficient to prevent the water table from rising into waste. As stated in general comments, other strategies such as diverting groundwater flow or waste relocation should be evaluated in more detail at the predesign stage, as they may offer significant advantages over the subsurface drain (such as reducing the amount of excavated material or isolating waste from the water table more effectively).

11. <u>Section V.10.3, Page IV-109, Paragraph 3 and Page IV-110, Paragraph 1</u>. The text states, "For the purposes of atmospheric dispersion, the building's fixed contamination does not pose a threat, but any removable contamination can potentially be released during removal operations." Evidence supporting this statement is not clearly apparent, but should be presented. This is a broad statement and the text should provide evidence of its validity.

12. <u>Page IV-110, First Paragraph</u>. The text discusses the quantification of risk as a result of the remedial action at OU4. It does not indicate whether the analysis will quantify short-term effects, long-term effects, or both. A statement clarifying this should be added to the text.

13. <u>Section V.10.3, Page IV-110, Paragraph 2</u>. The text states, "Applicable dispersion factors for the 100 meters (m) and 2000 m receptors were identified so the diffusion of the dust plume could be quantified." The text does not clearly state why the 100 m and 2,000 m distances were chosen as the receptors for the dispersion model. Although on page IV-114 the text does state that 2,000 m was chosen as the distance to the closest fence line, the text does not conclusively justify the choice of these two distances. The text should present convincing evidence to justify these statements. These distances can be critical parameters in computing cancer risks. Clear justification is needed when determining the distance between the airborne emission source and the receptors.

14. <u>Page IV-113, Table IV.10-1</u>. This table presents exposure factors used to quantify risks from exposure to airborne contamination from remedial action at OU4. A receptor lifetime of 50 years is listed for workers, on-site adults, and off-site adults. Typically, a value of 70 years is used as lifetime duration. The value of 70 years should be used to conform to EPA guidance (EPA 1989a). Also, a body weight of 19.7 kilograms (kg) is listed for the off-site child receptor. Typically, a value of 15 kg is used for this parameter. The body weight should be 15 kg to conform to EPA recommendations (EPA 1989a).

15. Part IV, Section V.10.3, Page IV-114, Paragraph 4. The text states, "To determine the dispersion factors the CAP88-PC model was used." Results from this model are not but should be presented in the document. Documents that discuss the results from computer dispersion models should include the output from these models as supporting evidence.

16. Page IV-116, First Paragraph. The text states that some toxicity values were collected from a source other than the Integrated Risk Information System (IRIS; EPA 1994) or the Health Effects Assessment Summary Tables (HEAST; EPA 1993a). Only EPA sources of toxicity information should be used in quantifying risks. If a toxicity value is unavailable from IRIS, HEAST, or the Superfund Health Risk Technical Support Center, the toxicity of the chemical should be qualitatively evaluated.

17. Pages IV-117 through IV-128, Tables IV.10-2 through IV.10-5. These tables present risks associated with inhalation exposures to contaminants during remediation of OU4 for workers, on-site adult receptors, off-site adult receptors, and off-site child receptors. The second column of each table presents the intake value. It is unclear whether this value is actually the exposure concentration or the daily intake of the chemical. When the intakes are divided by the RfDs presented in the third column of each table, the results do not match the hazard quotients presented in the fourth column. Similarly, when the intakes are multiplied by the slope factors presented in the table, the result does not match the incremental cancer risk presented in the final column of each table. It should be noted that daily intakes for carcinogenic and noncarcinogenic chemicals are not the same because the averaging time used in the exposure equations are different. Only one intake equation is presented in the text (page IV-115) and it does not include averaging time. This evaluation is poorly explained and the results are unverifiable. Furthermore, toxicity values for some chemicals are not from EPA sources and are not verifiable (for example, potassium and sodium). The evaluation and toxicity values should be reexamined for accuracy and corrected as necessary.

18. Page IV-130, Table IV.10-6. The table presents risks associated with exposure to airborne radionuclide contamination during remedial activities. The citation for the source of the dose conversions and toxicity values is not provided. Additionally, the calculation to convert the dose conversion factors from units of sieverts per becquerel (Sv/Bq) to millirem per picocurie (mrem/pCi) is not provided. EPA guidance presents dose conversion factors in units of Sv/Bq; these values should have been converted. The dose conversion factors presented in

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the table are slightly higher than those calculated from the values presented in EPA guidance (EPA 1988). The source of the dose conversion factors should be cited and the units should be converted to mrem/pCi for verification. This comment also applies to Tables IV.10-7, IV.10-8, and IV.10-9.

Additionally, the inhalation slope factor for tritium could not be verified. It does not appear in HEAST (EPA 1993a). The slope factor should be referenced and only EPA-approved values should be used.

19. Pages IV-131 through IV-133, Tables IV.10-7 through IV.10-9. These tables present the radionuclide risk assessment of inhalation exposures for on-site adult residents, off-site adult residents, and off-site child residents. The slope factor for tritium could not be verified and does not appear in HEAST (EPA 1993a). Additionally, the slope factors for uranium-235 and -238 are incorrect. The slope factors should be verified for accuracy and corrected as necessary.

These tables also present dose equivalents for each receptor. Calculation of dose equivalents, as opposed to cancer risks, is not appropriate for child receptors and may not be appropriate for off-site or on-site adults who are not workers. EPA guidance states, "[Coefficients of dose conversion] are intended for general use in assessing average individual committed doses in any population that can be characterized adequately by Reference Man" (EPA 1988). Reference Man is a hypothetical receptor who is conceptualized as having the anatomical and physiological characteristics of a healthy 20- to 30-year-old male with a total body mass of 70 kg. The adult receptor populations may not correspond to this description, and child receptors certainly are not characterized by Reference Man. Only cancer risks from exposure to radionuclides should be calculated for these three receptor populations.

20. Page-134, Section IV.10.3.2. The text lists the various assumptions made for the air dispersion modeling, including body weight for children. The value presented is 19.7 kg; the typical value is 15 kg. A body weight of 15 kg should be used to conform with EPA recommendations (EPA 1989a and 1989b). An airborne release fraction is also listed, but the source of the fraction is not EPA guidance. If EPA guidance recommends an airborne release fraction, it should be used in the model.

21. Page IV-137 through IV-148, Tables IV.10-11 through IV.10-14. Several RfDs and CSFs presented in these tables could not be verified; they do not appear in HEAST or IRIS and a reference for the values is not provided. The toxicity values should be corrected as necessary. Additionally, the calculated hazard quotients and incremental cancer risks appear to be incorrect. As described in specific comment 14, they appear to have improperly calculated. References should be provided for all toxicity information.

22. Page IV-149, Table IV.10-15. The table presents the incremental cancer risk and dose equivalent for on-site workers remediating Building 788. The slope factor for tritium does not appear in HEAST (EPA 1993a) and references for the slope factors and dose conversion factors are not cited. References for this information should be provided.

Additionally, as described in Specific Comment 15, dose conversion factors in EPA guidance (EPA 1988) are presented in units of Sv/Bq. A conversion is necessary to change the units to mrem/pCi. The dose conversion factors presented in Table IV.10-15 are slightly higher than those calculated from EPA guidance. Dose conversion factors should be presented in Sv/Bq and the unit conversion should be presented in the document for verification.

23. Page IV-150, Table IV.10-16. The table presents a summary of the estimates of radiation dose from Building 788 to receptors. Results for on-site adults, off-site adults, and off-site children are listed. The table does not, however, provide slope factors, intake values, or modeled contaminant concentrations. These values should be presented in the table.

Furthermore, dose equivalents are inappropriately presented for each receptor. Calculation of dose equivalents, as opposed to cancer risks, is not appropriate for child receptors and may not be appropriate for off-site or on-site adults who are not workers. EPA guidance states, "[Coefficients of dose conversion] are intended for general use in assessing average individual committed doses in any population that can be characterized adequately by Reference Man" (EPA 1988). Reference Man is a hypothetical receptor who is conceptualized as having the anatomical and physiological characteristics of a healthy 20- to 30-year-old male with a total body mass of 70 kg. The adult receptor populations may not correspond to this description, and child receptors certainly are not characterized by Reference Man. Only cancer risks from exposure to radionuclides should be calculated for these three receptor populations.

Tables IV.10-17 and IV.10-18 summarize the tables discussed above. They will require revisions based on these comments.

24. Pages IV-153 through IV-164, Section IV.10.4.1. This section describes the selected VLEACH. The selected model is acceptable for this analysis, but several assumptions used in the modeling do not appear to be conservative and should be more fully described. For example, the text refers to "an assumed chemical species" but does not identify the species. If assumptions were made regarding chemical properties on a chemical-species basis as opposed to being chemical-specific, the species and assumptions should be presented in the text. Other parameters that were not specified and that could affect the results of the model are the pH and redox potential of the soil. The distribution coefficients for soil-water partitioning (K_d) were not specified; K_d of a chemical can be affected by the mineralogy of the soil. K_d values should be specified for each chemical. The most conservative assumption of physical parameters would be preferential flow; it is not clear whether this assumption was made. Chemical equilibrium was also assumed, which is not a conservative assumption. Overall, the assumptions made for the leaching model do not appear to be conservative and should be justified. Additionally, more chemical-specific data should be provided.

25. Page IV-196, Section IV.11.5. This section evaluates the proposed remedy for its consistency with final remedies. The section should evaluate the effects of potential groundwater extraction on cap subsidence and slope stability. Extracting groundwater could cause subsidence and consequently lower the subsurface drain location or make slopes potentially unstable.

2.5 PART V

General Comments

1. The conceptual design of the monitoring system is integrated into the multilayer engineered cover that has been proposed previously. Therefore, any modifications to the engineered cover will require modification to the monitoring plan.

2. The need for new walls for the post closure care monitoring should be re-evaluated once the Phase II work is completed.

3. The scope of the post closure care monitoring plan presented in this draft IM/IRA document is brief. The detailed post closure monitoring plan (to be submitted as part of the closure plan) will be re-evaluated

Specific Comments

1. Section V.4.3.1, Page V-49, Third Paragraph. This paragraph states that Drawing 51045-155 illustrates the proposed locations for monitoring wells screened in the upper stratigraphic unit, and that both new and existing wells will be used for compliance monitoring at the point of compliance. Drawing 51045-155 does not illustrate any existing wells at the point-of-compliance. The text and figures should be consistent in describing and illustrating the monitoring wells to be used for compliance monitoring.

2. Section V.4.3.1, Page V-49, Fourth Paragraph. This paragraph lists three existing alluvial/colluvial wells and seven existing weathered bedrock wells that are located along the point-of-compliance boundary of the solar evaporation ponds. These wells will be included in the groundwater monitoring system for compliance monitoring if they are not destroyed during construction of the engineered cover. The last sentence of this paragraph states that Drawing 51045-155 shows only the locations of the new compliance monitoring wells based on the assumption that the existing wells will be destroyed during construction. The locations of the existing wells should be illustrated on Drawing 51045-155 to provide the reader with a point of reference. In addition, if existing wells are destroyed, new wells should be installed in similar locations to ensure that no gaps appear in the groundwater monitoring network.

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The text should be modified to include an explanation of how gaps will be filled in the event that existing wells in critical locations are destroyed during construction. All wells proposed as part of the monitoring network should be included on Drawing 51045-155 to provide consistency. The text should also comprehensively describe the wells to be used in the network based on sound technical reasoning.

3. Section V.4.3.1, Page V-50, (First Full Paragraph). This paragraph describes existing wells that will be included in the post-closure monitoring system for compliance and performance monitoring. Three of the five wells listed are illustrated on Drawing 51045-155, while the other two (alluvial/colluvial well P207889 and weathered bedrock well P207989) are not illustrated on the drawing. All wells to be included in the post-closure monitoring system for compliance and performance monitoring should be included on Drawing 51045-155 to provide the reader with a complete understanding of the planned monitoring network.

4. Section V.4.3.1, Page V-50, (Second Full Paragraph). The first sentence of this paragraph states that where existing wells are not present along the point-of-compliance boundary, new wells will be installed at intervals of approximately 200 feet. Drawing 51045-155 illustrates only the proposed new wells, which are not necessarily spaced at 200-foot intervals. The existing wells to be used in the monitoring network should be illustrated on Drawing 51045-155 to provide the reader with complete information about all groundwater monitoring network wells. In addition, if the groundwater monitoring network will rely completely on new wells, these wells should be installed at 200-foot intervals rather than being 300 feet apart.

The third sentence of this paragraph states that seven existing weathered bedrock wells, three existing alluvial/colluvial wells, and seven new wells are proposed for post-closure compliance monitoring at OU4. Drawing 51045-155 illustrates only 14 of these proposed 17 new wells at the point-of-compliance boundary of the solar evaporation ponds. The text description and the drawing should be corrected.

The fourth sentence of this paragraph states that an additional eight existing weathered bedrock wells and five existing alluvium/colluvium wells will be included in the post-closure monitoring system for compliance and performance monitoring. Drawing 51045-155

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illustrates only seven existing bedrock wells and four existing alluvium/colluvium wells. The text and drawing should be corrected.

5. Section V.6.1.3, Page V-69. This section states that monitoring schedules will be intensified at the discretion of the project manager should releases or potential releases be detected. The text should be clarified to list who (specifically regulatory agencies) will be notified of the potential releases and what role they will have in determining if other steps should be taken in addition to the increase in monitoring schedules.

6. Section V.6.1.3, Page V-69, and Section V.6.2.3, Page V-71. The text in these two sections states that an exceedence event will be evaluated in writing. The text should be revised to state to whom the written document will be submitted (that is, the file, regulatory agencies, others).

7. Section V.6.2.1, Page V-70, First Paragraph. The text states that the statistical evaluation of frequency domain capacitance (FDC) data from beneath the subsurface drain layer will be the same as for FDC measurements related to the final engineered cover monitoring system. Paragraph 2 states that the neutron probe data will be collected from neutron access tubes beneath the gravel drain. Figure 51045-150 does not show any probes located beneath the subsurface drain. The text and the figures should be consistent.

8. Section V.9.1. This section discusses the procedures for abandoning of access casings and sensors. The Section V.9.2, which describes the abandonment of groundwater monitoring wells, is written in a different style, and discusses the procedures that will be followed in abandoning of the compliance monitoring wells for the solar evaporation ponds. These two sections should be written in a similar style and should provide consistent descriptions of the applicable regulations and procedures to be followed during the abandoning of access casings, sensors, or monitoring wells. The document should provide sufficient information to guide the abandonment activities that will occur during decommissioning of the OU4 monitoring system.

9. Section V.9.1.1.1, Page V-84, 1a. This section lists the elements of the planning stage for abandonment of monitoring system wells, boreholes, and vadose zone devices. Element 1a states that applicable federal, state, and local regulations will be reviewed to determine the

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procedures and required documentation for abandoning of monitoring devices at OU4 of the RFP. A review of applicable regulations and requirements should be completed and incorporated in the work plan describing the installation and eventual decommissioning of a monitoring system for an engineered cover. This section of the report should be revised to include a description of the applicable regulations. A complete review of all federal, state and local requirements will provide information necessary for complete planning of post-closure and assessment activities.

10. Section V.9.1.1.1, Page V-84, 1f. This section lists the elements of the planning stage for abandonment of monitoring system wells, boreholes, and vadose zone devices. Element 1f states that "While not directly part of the decommissioning activity, proper disposal of displaced fluids and other materials...should be considered." As is further discussed, some of these materials may be classified as hazardous wastes under federal, state, and local regulations. It is appropriate to review the regulations and analytical documentation prior to classifying a material; however, some plans for proper disposal should also be included in the work plan in the event that any of these wastes are classified as hazardous. Although disposal of displaced fluids and other materials is not directly a part of the decommissioning activity, the possibility exists that materials generated during abandonment may be classified as hazardous. If that is the case, the work plan should include a discussion of the options for disposal of these wastes.

2.7 PHASE II WORK PLAN

General Comments

1. The proposed alluvial (Figure 5.3-1) and weathered bedrock (Figure 5.3-2) wells do not appear to be located in the areas determined to have preferential flow (Figure 3.3-3) of groundwater. In addition, no new wells are located in the areas where the ITS is not keyed into bedrock and its effectiveness is questioned (Figure A-5). It is apparent from the figures that the preferential flow areas and areas where the ITS is not keyed into bedrock coincide. Since there is a question as to what groundwater might be bypassing the ITS, it seems important to locate additional monitoring wells in the preferential flow areas.

2. Pages 3-53 and 3-54 (Figures 3.3-17 and 3.3-18) were missing from the EPA copy of the OU4 phase II (RFI/FI) work plan. These missing pages made it difficult to conduct a complete and coherent review of this section of the work plan.

3. In general, information in Section 3.3.2 is not clearly or completely presented, and should be carefully reconsidered and rewritten to provide a simple and clearly conceived presentation of general inorganic geochemistry ~~at O~~U4.

4. The text of the IM/IRA risk analysis discussion states that no environmental evaluation (EE) will be provided until the IM/IRA is installed and the Phase II RI is in process. This agrees with discussions involving EPA, DOE, and the State of Colorado. The EE will be highly reduced from the standard for the less developed areas of RFP, which is acceptable.

5. Section 7 provides a comprehensive outline of how the baseline risk assessment (BRA) will be performed. In general, the outline is complete; however, more specific information should be provided on certain steps of the risk assessment. The BRA is ambiguous without specific information.

6. Groundwater exposure pathways are not described in the BRA and do not appear to have been included in any exposure scenario. Groundwater exposure pathways are potentially complete and may pose significant health risks. They should be included in the BRA; conservative exposure parameters should be used to assess complete exposure pathways.

Specific Comments

1. Section 3.3.2.3. Although upgradient (local background) water sample analytical results were compared with analytical results for samples collected from the solar evaporation ponds and with analytical results for groundwater samples collected from wells downgradient of the solar evaporation ponds, no direct comparison was made using trilinear diagrams. It would be reasonable to plot inorganic data for actual solar evaporation pond water samples on the same trilinear diagram as upgradient groundwater samples and downgradient groundwater samples. A graphical illustration of this type would help support the conclusion that mixing is occurring, and would provide the reader with a clearer understanding of the rationale behind the conclusion.

2. Page 3-55, First Paragraph. The conclusion is made that the change over time in chemistry of samples collected from well 3086 is due to decrease in or cessation of solar evaporation pond leakage over time and to dilution by relatively uncontaminated groundwater. Without endpoints of upgradient groundwater and solar evaporation pond sample chemistry, the rationale for this conclusion is not clear. The trilinear diagram should include data points for end points of solar evaporation pond water data presented.

3. Section 3.3.2.4, Page 3-55, First Paragraph. If process wastewater samples are available over time, it would be reasonable to provide the data and plot trilinear diagrams for these analytical results to display the changes in water type within the ponds over time. Potentially, the water types of groundwater in wells near to the solar evaporation ponds may be responding to changes in solar evaporation pond water rather than to cessation of pond leakage or dilution from local groundwater.

4. Page 3-55, Last Paragraph. This paragraph states that Figure 3.3-20 suggests that groundwater from monitoring well 2996 could be the result of mixing solar evaporation pond water and groundwaters. The data presented on this trilinear diagram do not suggest this. It would have been appropriate to reach such a conclusion if the mixing scenario had included data for solar evaporation pond water and for water from an upgradient well. Well 2886 water was used in Figure 3.3-20 as one of the end members; therefore, it is not reasonable to suggest that mixing water from this well with solar evaporation pond water will produce the chemistry exhibited by the water from this well.

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5. Page 3-55, Last Paragraph. The second sentence of this paragraph refers to a more detailed scenario not discussed in this document. This scenario should be explained or referenced to provide the reader with complete information to support conclusions made within the document.

6. Figures 3.3-19, 3.3-20 and 3.3-21. Figures presented in this section are difficult to interpret because of overlapping symbols and letters. Different symbols and a clearer explanation of what each figure illustrates would provide the reader with a clear understanding of the discussion and conclusions presented.

7. Page 5-58, First Full Paragraph. This paragraph suggests that solar evaporation pond water moving through weathered bedrock materials was depleted of sodium and enriched in calcium. The explanation presented was that sodium-rich, pond-derived water moving through the vadose zone or alluvial or weathered bedrock materials was enriched in calcium and depleted in sodium due to cation exchange. It is unlikely that sodium in solution would be replaced by calcium present in alluvial or weathered bedrock material. Sodium is likely to remain in solution unless the solution has a high sodium concentration. Several other explanations for the change in water type are possible and should be presented in this section. In particular, it is more likely that the wells completed in the weathered bedrock on the hillside north of the solar evaporation ponds are simply in a different portion of the aquifer and have had little or no contact with solar evaporation pond water.

8. Section 3.3.2, Pages 3-49 through 3-60. Discussions of the groundwater quality and geochemistry should also include a reference to a map or maps to portray where the wells being discussed. This would allow the reader to understand the geochemistry and water quality spatially as well as chemically. References to maps showing the locations of the wells discussed should be added to the text.

9. Section 7, Page 7-2, Second Reference. IRIS is listed at the end of the reference. IRIS is an independent source of information; it is not part of the cited document. The IRIS reference should be listed separately.

10. Section 7, Page 7-5, Section 7.1.3.1. This section identifies criteria that will be used to evaluate analytical data. This section should describe how the data will be evaluated with

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respect to blank samples. If a chemical is a common laboratory contaminant, Risk Assessment Guidance for Superfund (RAGS) (EPA 1989a) recommends that it is retained in the risk assessment only if it is 10 times greater than the concentration of that chemical in the blank. If it is not a common laboratory contaminant, the chemical is retained as a COC if it is five times greater than the chemical concentration in the blank. This section should also list evaluation of tentatively identified compounds as part of the data evaluation.

11. Section 7, Page 7-6, Last Paragraph, Second Sentence. The text states that guidelines for evaluation of data validation as described in RAGS will be used in assessing data usability. A description of how this evaluation will be performed is necessary. Level III and IV data are required by EPA for use in risk assessments.

12. Section 7, Page 7-6, Second Set of Bullets. This section describes comparison of site contaminants to background levels. The description is incomplete. It should also describe how hot spots will be identified in the data evaluation analysis.

13. Section 7, Page 7-7, Third Bullet. The text states that chemicals detected at levels significantly above their naturally occurring concentrations will be retained as contaminants of concern. A complete description of where background samples will be collected, how many samples will be collected, and the type of statistical tests that will be applied to determine significant differences should be provided. Adequate information should be provided to allow the reader to determine if the background analysis has been carried out correctly. Background analyses are extremely important to the risk assessment process, as they assist with determination of achievable cleanup levels and selection of site-related contaminants of concern.

14. Section 7, Page 7-10, First Bullet. The text reads, " maintenance workers could have incidental contact via dermal absorption for direct soil ingestion, inhalation of vapor phase contaminants, ..." This statement is not clear. The text should indicate if both direct contact with soils and soil ingestion will be evaluated or if only soil ingestion will be assessed.

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15. Section 7, Page 7-10, Second Bullet. If a residential scenario is possible, ingestion of fruits and vegetables should be evaluated. Ingestion of groundwater should also be evaluated or an explanation of why this pathway is not considered complete should be provided. The risk assessment should consider all potential exposure pathways.

16. Section 7, Page 7-11, Development of Exposure Concentrations, First Paragraph. The first sentence states that exposure point concentrations of COCs in soil, air, and water will be estimated using spreadsheet calculations and computer models. The text should describe in more detail the computer models that will be used. In addition, water is listed in this paragraph. The section describing exposure scenarios did not indicate that there are exposure pathways associated with groundwater or surface water. The text should be modified to clarify this discrepancy.

17. Section 7, Page 7-11, Development of Exposure Concentrations, Second Paragraph. The text states that "Depending on the spatial variability of contamination, different averaging may apply to each contaminant." This statement should be clarified. It is not clear what is meant by the term "spatial variability." The text should state whether it is referring to the distribution of the data or the variability of the samples onsite. Typically, if a given contaminant exhibits a log-normal distribution, the upper 95 percent confidence limit of the geometric mean is used as the exposure point concentration. If the data for a contaminant are normally distributed, then the upper 95 percent confidence limit on the arithmetic mean is used as the exposure point concentration. It is not clear if this is what the statement in the text is describing.

18. Section 7, Page 7-14, Third paragraph, Last Sentence. The text states that if health-based toxicity criteria are not available for a chemical, a health-protective number will be derived using established procedures listed in RAGS (EPA 1989a). This statement should be clarified. RAGS states that a toxicity value may be derived using EPA methodology. This derivation should be done in conjunction with the regional risk assessment contact, who will submit the derivation to Environmental Criteria and Assessment Office (ECAO) for approval. The text should provide more information regarding how toxicity values will be derived.

19. Section 7, Page 7-18, Second paragraph, Second Sentence. The text states that slope factors will be used to estimate radiological risks from exposure for up to four pathways: inhalation,

ingestion, air immersion, and external irradiation. It is not clear what is meant by air immersion. HEAST 1993 does not present a toxicity value for air immersion. This discrepancy should be clarified.

20. <u>Section 7, Page 7-24, Paragraph 4</u>. The text states that the exposure assessment related to groundwater for the EE would examine groundwater contaminants "reaching vegetation around seeps and impacting biota." The rationale behind this approach is not clear. The statement appears to limit concern to plant uptake of contaminants and not consider that fauna of the area may drink contaminated water directly. This statement should be clarified.

21. <u>Section 8, Subsection 1.0, Page 4, Paragraph 2</u>. This section presents the organization of EG&G Rocky Flats and the Environmental Management (EM) Department. However, not included is a list of contractors. As stated in the EPA guidance document on quality assurance project plans (QAPP), the QAPP is requested to describe and provide a table illustrating project responsibilities including subcontractors. This section should include a list of each organizational project and its subcontractor.

22. <u>Table C-1</u>. The maximum contaminant levels (MCLs) for radium-226 and radium-228 are incorrect according to the Drinking Water Regulations and Health Advisories recommended by the Office of Water, May 1993 (EPA 1993b). The MCLs recommended by the EPA Office of Drinking Water are 20 picoCuries per liter (pCi/L).

    Table C-1 does not list the MCL or the maximum contaminant level goal (MCLG) for butyl benzyl phthalate. The EPA Office of Drinking Water recommends an MCL of 0.1 micrograms per liter (μg/L) and an MCLG of 0 μg/L. The table should be corrected.

23. <u>Table C-2</u>. It is not clear why several of the columns carry identical headings but list different numbers. For example, there are two columns with the heading "SDWA Maximum Contaminant Level," and there are two columns with the heading "SDWA Maximum Contaminant Level Goal." There should be a footnote indicating the differences between the columns of numbers.

    The MCL for endrin is incorrect. The number should be 0.1 μg/L (EPA 1993b). The number presented is 2.0 μg/L. The table should be corrected.

The MCL for lead incorrect. The value listed is 15 μg/L. The Office of Water (EPA 1993b) recommends a value of 0 μg/L.

3.0 REFERENCES

National Academy of Sciences (NAS). 1989. Food and Nutrition Board Recommended Daily Allowances.

U.S. Environmental Protection Agency (EPA). 1988. Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion. EPA-520/1-88-020. Office of Radiation Programs. Washington, D.C. September.

EPA. 1989a. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002. Office of Emergency and Remedial Response, Washington, D.C. December.

EPA. 1989b. Exposure Factors Handbook. EPA/600/8-89/043. Exposure Assessment Group, Office of Health and Environmental Assessment. Washington, D.C.

EPA. 1993a. Health Effects Assessment Summary Tables. FY 1993. Office of Emergency and Remedial Response, Office of Health and Environmental Assessment. OHEA ECAO-CIN-909. Washington, D.C. March.

EPA. 1993b. Office of Water, Drinking Water Regulations and Health Advisories, May 1993.

EPA. 1994. Integrated Risk Information System Chemical Files.